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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/725,724	11/21/2003	Joseph John Shiang	28230-3	1007

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GENERAL ELECTRIC COMPANY
GLOBAL RESEARCH
PATENT DOCKET RM. BLDG. K1-4A59
NISKAYUNA, NY 12309

EXAMINER	
CANNING, ANTHONY J	

ART UNIT	PAPER NUMBER
2879	

MAIL DATE	DELIVERY MODE
06/04/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/725,724	SHIANG ET AL.	
	Examiner	Art Unit	
	Anthony J. Canning	2879	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *08 March 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13 and 15-22* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13 and 15-22* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *3/07*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Acknowledgement of Amendment

The amendment to the instant application was entered on 11 September 2006.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-4, 6, 7, 9-13, 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hori et al. (J.P. 11-307266) in view of Jenkins et al. (U.S. 5,396,570).

Regarding claims 1 and 20, Hori et al. disclose an organic electroluminescent light emitting device and the method therefore (paragraph 0001), comprising: a first electrode (see Drawing 9, item 926; paragraph 0069); a second electrode (see Drawing 9, item 95; paragraph 0069); at least one organic light emitting layer (see Drawing 9, item 94; paragraph 0069); and a ceramic output coupler (see Drawing 9, item 97'; paragraphs 0063 and 0069; titanium oxide and silicon oxide are both ceramics), which comprises a ceramic material and a plurality of voids distributed therein (ceramic materials by definition are inherently porous; also the periodically repeating ceramic materials in layer 97 create voids between the titanium oxide and silica oxide).

Hori et al. fail to specifically disclose that the ceramic material includes alumina, Y_2O_3, $Y_2Al_{15}O_{12}$, Mg Al_2O_4, MgAlON, AlN, AlON, TiO_2-dopped ZrO_2, or a combination thereof.

In the same field of endeavor, Jenkins et al. discloses a ceramic output coupler made of alumina (see Fig. 1, item 14; column 12, lines 21-23). Output couplers are used to direct light, and alumina is a transparent inexpensive insulating material.

Therefore, it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to modify the organic electroluminescent light-emitting device of Hori et al. to include that the ceramic output coupler includes a ceramic material made from alumina, as taught by Jenkins et al., to have a transparent inexpensive insulating material.

Regarding claim 2, Hori et al. and Jenkins et al. disclose the device of claim 1. Hori et al. further disclose that the device comprises an organic light emitting diode (paragraph 0005; the luminous layer emits light via radiative recombination of electrons and holes in the organic luminous layer, this is the principle under which light-emitting diodes work); and the ceramic output coupler comprises a ceramic layer containing a light-emitting surface of the device (see Drawing 9, item 97'; paragraph 0069).

Regarding claim 3, Hori et al. and Jenkins et al. disclose the device of claim 2. Hori et al. further disclose that the ceramic output coupler reduces a critical angle loss and a Fresnel loss (this is a inherent property of function of the ceramic output coupler); and an index of refraction of the ceramic output coupler (n= 1.6 for silicon monoxide) is matched to an index of refraction of an adjacent layer (see Drawing 9, item 91; paragraphs 0069; n=1.5 for glass, the indices of refraction are similar and the examiner interprets this as being matched) of the electroluminescent device.

Regarding claims 4 and 6, Hori et al. disclose and Jenkins et al. the device of claims 2 and 3. Hori et al. further disclose that the index of refraction of the ceramic output coupler (n=1.6 for silicon monoxide) differs by 0.1 or less from the index of refraction of the adjacent layer (n= 1.5 for glass) of the electroluminescent device.

Regarding claim 7, Hori et al. and Jenkins et al. disclose the device of claim 6. Hori et al. further disclose that the index of refraction of the ceramic output coupler (n=l.6 for silicon monoxide) is the same or greater than the index of refraction of the substrate (n= 1.5 for glass) of the electroluminescent device.

Regarding claim 9, Hori et al. and Jenkins et al. disclose the device of claim 2. Hori et al. further disclose that the ceramic output coupler comprises a shaped ceramic material (see Drawing 9, item 97'; paragraph 0069, the repeated periodically of two ceramics is a shaped ceramic) attached to the organic light emitting diode (see Drawing 9, item 97').

Regarding claim 10, Hori et al. disclose the device of claim 9. Hori et al. further disclose that the ceramic output coupler includes translucent ceramic material (paragraph 0069, since only some of the light is allowed to pass through layer 97', layer 97' is translucent) having a corrugated or dimpled light-emitting surface (see Drawing 9, item 97').

Regarding claim 11, Hori et al. and Jenkins et al. disclose the device of claim 10. Hori et al. fail to specifically disclose that each dimple has a height greater than 0.1 microns and a spacing between dimple or corrugation peaks is a factor of 10 or less of the dimple height. From the applicant's specification (page 8, lines 26-31 through page 9, lines 1-9) the dimples or corrugations may be omitted and therefore is not a critical element for the invention. Consequently, the claimed dimple/corrugation height and spacing is not a range with criticality

to the invention.

Furthermore, to establish unexpected results over a claimed range, applicants should compare a sufficient number of tests both inside and outside the claimed range to show the criticality of the claimed range. In re Hill, 284 F.2d 955, 128 USPQ 197 (CCPA 1960). An affidavit or declaration under 37 CFR 1.132 must compare .the claimed subject matter with the closest prior art to be effective to rebut aprimafacie case of obviousness. In re Burckel, 592 F.2d 1175,201 USPQ 67 (CCPA 1979). "A comparison of the claimed invention with the disclosure of each cited reference to determine the number of claim limitations in common with each reference, bearing in mind the relative importance of particular limitations, will usually yield the closet single prior art reference." In re Merchant, 575 F.2d 865,868, 197 USPQ 785, 787 (CCPA 1978). Where the comparison is not identical with the reference disclosure, deviations therefrom should be explained, In re Finley, 174 F.2d 130, 81 USPQ 383 (CCPA 1949), and if not explained should be noted and evaluated, and if significant, explanation should be required. In re Armstrong, 280 F.2d 132, 126 USPQ 281 (CCPA 1960) (deviations from example were inconsequential).

Regarding claim 12, Hori et al. and Jenkins et al. disclose the device of claim 2. Hori et al. further disclose that the ceramic output coupler randomly volume scatters light emitted by the organic light emitting layer (paragraph 0069; periodic refractive-index distribution is formed of a dielectric layer 97 and 97', distribution periodic to the effective index is formed in the waveguide of the light to spread) to reduce a critical angle loss (this is an inherent property of the ceramic output coupler).

Regarding claim 13, Hori et al. and Jenkins et al. disclose the device of claim 12. Hori et

al. further disclose that the device comprises an organic light emitting diode (paragraph 0005; the luminous layer emits light via radiative recombination of electrons and holes in the organic luminous layer, this is the principle under which light-emitting diodes work), the ceramic coupler comprises a ceramic layer containing a light emitting surface of the device (see Drawing 9, item 97'; paragraph 0069), and the ceramic output coupler volume contains voids which randomly scatter light emitted by the organic light emitting layer to reduce a critical angle loss (paragraph 0069; periodic refractive-index distribution is formed of a dielectric layer 97 and 97', distribution periodic to the effective index is formed in the waveguide of the light to spread; ceramics inherently are a porous material and will therefore randomly scatter light, which will reduce a critical angle loss).

Regarding claim 22, Hori et al. and Jenkins et al. disclose the method of claim 20. Hori et al. further disclose forming the first electrode of a transparent conductive material (see Drawing 9, item 926; paragraph 0069) over the ceramic output coupler (see Drawing 9, item 97; paragraph 0069) which comprises a ceramic substrate (see Drawing 9, item 97'; paragraph 0069); forming the at least one organic light emitting layer over the first electrode (see Drawing 9, item 94; paragraph 0069); and forming a second electrode of a metal material over the at least one organic light emitting layer (see Drawing 9, item 95; paragraph 0069).

Claims 15-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hori et al. (J.P. 11-307266) in view of Jenkins et al. (U.S. 5,396,570) and in further view Shimizu et al. (U.S. 5,998,925).

As to claim 15, Hori et al. and Jenkins et al. disclose the device of claim 2. Hori et al. fail

to disclose that the ceramic output coupler includes a light-emitting material.

In the same field of endeavor, Shimizu et al. disclose a light-emitting (see Fig. 1; column 1, lines 9-15) device including a ceramic output coupler (see Fig. 2, item 201; column 16, lines 54-67; glass is silicon dioxide which is a porous ceramic, also the dispersant is titanium oxide which is a porous ceramic; item 101 from figure 1 corresponds to item 201 from figure 2), which includes a light-emitting material (column 16, lines 54-60). Shimizu et al. further disclose that this arrangement allows for a desired emission pattern because the light is emitted after being diffused by the light-emitting material (column 9, lines 10-12).

Therefore, it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to modify the light-emitting device of Hori et al. to include that the ceramic output coupler includes a light-emitting material, as taught by Shimizu et al., to allow for a desired emission pattern because the light is emitted after being diffused by the light-emitting material.

As to claims 16 and 17, Hori et al., Jenkins et al. and Shimizu et al. disclose the device of claim 15. Shimizu et al. further disclose that the light-emitting material is a ceramic phosphor, and that the ceramic phosphor is YAG:Ce3+ (column 10, lines 25-27). Shimizu et al. further disclose that YAG:Ce3+ shows excellent resistance against light and heat so that the properties thereof do not change even when used over an extended period of time.

Therefore, it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to modify the light-emitting device of Hori et al. to include that the light-emitting material is a ceramic phosphor, and that the ceramic phosphor is YAG:Ce3÷, as taught by Shimizu et al., for the advantage that YAG:Ce3÷ shows excellent resistance against

light and heat so that the properties thereof do not change even when used over an extended period of time.

As to claim 18, Hori et al. and Jenkins et al. disclose the device of claim 2. Hori et al. fail to disclose that the ceramic output coupler includes a ceramic matrix material including light-emitting particles.

In the same field of endeavor, Shimizu et al. disclose a light-emitting (see Fig. 1; column 1, lines 9-15) device including a ceramic output coupler (see Fig. 2, item 201; column 16, lines 54-67; glass is silicon dioxide which is a porous ceramic; item 101 from figure 1 corresponds to item 201 from figure 2), which includes a ceramic matrix material (column 16, lines 60-67; the titanium oxide dispersant and glass coating material constitute a matrix) containing light-emitting material (column 16, lines 54-60). Shimizu et al. further disclose that this arrangement allows for a desired emission pattern because the light is emitted after being diffused by the light-emitting material (column 9, lines 10-12).

Therefore, it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to modify the light-emitting device of Hori et al. to include that the ceramic output coupler includes a ceramic matrix material including light-emitting particles, as taught by Shimizu et al., to allow for a desired emission pattern because the light is emitted after being diffused by the light-emitting material.

As to claim 19, Hori et al., Jenkins et al. and Shimizu et al. disclose the device of claim 18. Shimizu et al. further disclose that the light-emitting material includes semiconductor particles (column 10, lines 25-27; YAG:Ce3+ is a semiconductor material). Shimizu et al. further disclose that YAG:Ce3+ shows excellent resistance against light and heat so that the properties thereof do

not change even when used over an extended period of time.

Therefore, it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to modify the light-emitting device of Hori et al. to include that the light-emitting material includes a semiconductor material, as taught by Shimizu et al., for the advantage that YAG:Ce3+ shows excellent resistance against light and heat so that the properties thereof do not change even when used over an extended period of time.

Claims 5, 8 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hori et al. (J.P. 11-307266) in view of Jenkins et al. (U.S. 5,396,570) and in further view of Kawase (U.S. 6,472,817 B1).

As to claims 5 and 8, Hori et al. and Jenkins et al. disclose the device of claims 4 and 7. Hori et al. fail to disclose that the ceramic output coupler is the same as the index of refraction of the adjacent layer of the electroluminescent device.

In the same field of endeavor, Kawase discloses an organic electroluminescent device (see Fig. 8c; column 1, lines 8-9) with a ceramic output coupler (see Fig. 8c, item 20; column 3, lines 64-67 through column 4, lines 1-2; silicon dioxide is a porous ceramic) that has the same as the index of refraction of the adjacent layer (see Fig. 8c, item 8; the second table in column 4; the transparent substrate, item 8, has an index of refraction between 1.45-1.6, and the output layer, item 20, has an index of refraction between 1.4-1.5; the two indices of refraction overlap, therefore they can be the same) of the electroluminescent device. Kawase further discloses that this arrangement reduces the loss of light to the substrate (column 3, line 67 through column 4, line 1).

Therefore, it would have been obvious to one having ordinary skill inthe art, at the time the invention was made, to modify the organic electroluminescent device of Hori et al. to include that the ceramic output coupler is the same as the index of refraction of the adjacent layer of the electroluminescent device, as taught by Kawase, to reduce the loss of light to the substrate.

As to claim 21, Hori et al. and Jenkins et al. disclose the device of claim 21. Hori et al. fail to disclose forming the first electrode of a transparent conductive material over a first surface of a glass or polymer substrate; forming the at least one organic light-emitting layer over the first electrode; forming a second electrode of a metal material over the at least one organic light-emitting layer; and forming the ceramic output coupler over the second surface of the glass or polymer substrate.

In the same field of endeavor, Kawase discloses an organic electroluminescent device (see Fig. 8c; column 1, lines 8-9) wherein the first electrode (seeFig. 8c, item 4; column 3, lines 39-41) of a transparent conductive material (column 3, lines 39-41) is formed over a first surface of a glass or polymer substrate (see Fig. 8c, item 8; column 1, lines 24-26; the second table in column 4, item 8 is a transparent substrate); the at least one organic llght-emitting layer (see Fig. 8c, item 6; column 3, lines 64-67 through column 4, lines 1-13) is formed over the first electrode (see Fig. 8c, item 6 is formed over item 4); a second electrode (see Fig. 8c, item 2; column 4, lines 7-13) of a metal material (column 1, lines 24-26) is formed over the at least one organic light-emitting layer (see Fig. 8c, items 6 and 2); and the ceramic output coupler (see Fig. 8c, item 20; column 3, lines 64-67 through column 4, lines 1-6) is formed over the second surface of the glass or polymer substrate (see Fig. 8c, items 8 and 20).. Kawase further discloses that this arrangement reduces the loss of light to the substrate (column 3, line 67 through column 4, line

1).

Therefore, it would have been obvious to one having ordinary skill in the art, at the time the invention was made, to modify the organic electroluminescent device of Hori et al. to disclose forming the first electrode of a transparent conductive material over a first surface of a glass or polymer substrate; forming the at least one organic light-emitting layer over the first electrode; forming a second electrode of a metal material over the at least one organic light-emitting layer; and forming the ceramic output coupler over the second surface of the glass or polymer substrate, as taught by Kawase, to reduce the loss of light to the substrate.

Response to Arguments

The terminal disclaimer filed on 26 March 2007 disclaiming the terminal portion of any patent granted on this application which would extend beyond the expiration date of U.S. 6,703,780 has been reviewed and is accepted. The terminal disclaimer has been recorded.

Regarding the applicant's argument directed toward the material of the ceramic output coupler, the examiner notes that the list of materials claimed in claim 1 is the same as claimed in previous claim 14, except titanium oxide, which is disclosed by Hori et al. The examiner assumes that this list has been narrowed to overcome the previous rejection, but the specification of the instant application fails to disclose a criticality of these materials. It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the ceramic materials listed in claim 1, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice. *In re Leshin*, 125 USPQ.

Final Rejection

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Contact Information

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anthony J. Canning whose telephone number is (571)-272-2486. The examiner can normally be reached on M-F 8:00-4:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nimesh D. Patel can be reached on (571)-272-2457. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may 'be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications

may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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